SOME NEW AND LITTLE KNOWN SPECIES OF MALTHINI FROM THE SOUTHWESTERN UNITED STATES (COLEOPTERA: CANTHARIDAE)

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Abstract

Four new species of *Malthinus* and 3 new species of *Malthodes* from the southwest United States are described, as is the allotype male of *Malthinus tricolor* Fender. A revised key to the species of *Malthinus* of North America is included.

Introduction

Campbell and Marshall (1964) proposed the Ocular Index (O. I.) in their studies of Alleculidae. To obtain this index they divided the width of the head between the eyes at the narrowest point by the width of the head (including the eyes) at the widest point and multiplied the result by 100. To me it seems simpler to multiply the width of the head between the eyes by 100, then to divide it by the width of the head including the eyes. Similar indices of other areas can be usefully employed in some of the Cantharidae. The length of the pronotum × 100 divided by the width of the pronotum gives a pronotal index (P. I.). The width of the pronotum × 100 divided by the width of the head including the eyes gives a head-pronotum index (H. P. I.). Measurements should be at maximum extent except for the width of the head between the eyes. I plan to utilize these indices in this and future studies.

An antennal formula (A. F.) can be utilized also. In the Cantharidae, the comparative lengths of antennal segments 2 to 4, as well as the length to width formula for the intermediate segments (preferably the sixth), are frequently important. Those for segments 2 to 4 are carried to the least common denominator. For example, the formula 4-5-7, 4.5X indicates that segment 2 is four-fifths as long as segment 3 and four-sevenths as long as segment 4, whereas segment 3 is five-sevenths as long as segment 4. The intermediate segments (4.5X) are 4.5 times as long as wide. These ratios are often most important.

Malthinus rothi Fender, NEW SPECIES

(Fig. 1-2)

Black. Head flavous in front of eyes. Pronotum blackish brown, basal and apical margins narrowly testaceous, becoming more widely so toward angles. Apical fifth of elytra light creamy yellow. Apical angles of first four abdominal sternites narrowly testaceous. Legs piceous with knees feebly paler. Pubescence cinereous, fine, sparse and inconspicuous. Length 3.5mm.

MALE. Indices: O. I. 61; H. P. I. 77; P. I. 83; A. F. 11-14-17, 5.5X. *Head* suborbicular, flattened between moderately large and prominent eyes, dull, finely sparsely punctured, becoming granulate punctate on neck; antennae slender extending to tips of wings in repose. *Pronotum* transverse, shining, finely sparsely punctured, anterior margin arcuate, anterior angles rounded, lateral margins arcuate at middle then straight and narrowly converging to apical and basal angles, basal angles obliquely rounded, basal margin arcuate, marginal bead fine. Scutellum apically bilobed, lobes shallowly subtriangular, exposed portion finely closely punctured. *Elytra* shining, each ligulate to rounded apex, sides parallel, subsutural and discal costae feebly elevated, finely rugose-punctate basally, more coarsely rugose medially, pale apices tumid and finely, more closely punctured. Thorax beneath shining, very finely sparsely punctured. Abdominal sternites feebly shining, more coarsely punctured.

FEMALE: Unknown.

Male terminalia (ventral view): sixth abdominal sternite broadly deeply emarginate, apex of emargination arcuate; sides of seventh sternite rapidly sinuately converging to apex, apex broadly deeply emarginate, apex of emargination rounded, lobes thus formed rounded; ultimate tergite and small apical appendage, each semicircular; exposed sides of ventral plate not visible; ventral accessory process spinose, apically split, forks laterally reflexed; (lateral view): sixth sternite subquadrate, apical angles rounded; seventh sternite sub-cymbiform, sides of ventral plate elevated as small whitish semicircular discs; ventral spinose process slender, apically reflexed towards dorsal surface; last tergites normal.

Holotype male: ARIZONA: Cochise Co., S.(outh) W.(estern) R.(esearch) S.(tation), 5 mi. w. Portal, 24-VII-65, 5000′, Vincent Roth, [American Museum Natural History].

Malthinus cuspidatus Fender, NEW SPECIES

(Fig. 3-4)

Black. Head in front of middle of eyes and including antennal sockets, basal two-thirds of basal antennal segment beneath and pronotum rufous. Apices of elytra becoming dark olivaceous. Apices of coxae, trochanters and narrow bases of femora testaceous. Abdomen piceous. Pubescence cinereous, fine, sparse and inconspicuous. Length 2.75mm.

MALE. Indices: O. I. 65; H. P. I. 80; P. I. 78; A. F. 13-17-20, 4.5X. *Head* finely sparsely punctured, more finely so in front of antennae, antennal sockets with inner margins strongly elevated, interantennal area arcuately concave; antennae slender, extending to tips of wings in repose. Pronotum shining, transverse, anterior margin shallowly arcuate, anterior angles rounded, sides strongly descending, feebly arcuately converging to obtusely rounded hind angles, basal margin unevenly arcuate, becoming nearly straight and oblique towards sides, marginal bead moderately fine on apical and basal margins, very fine on sides when viewed dorso-laterally *Scutellum* finely closely punctured, wider than long, apically bilobate, lobes rounded. *Elytra* abbreviated, extending to base of third abdominal sternite, narrowing apically from humeri to tips, apically dehiscent, two evident impunctate discal costae extending from near base to tumid and finely punctured apical fourth, intercostal areas with confused coarser punctures. Thorax beneath shining, sparsely, rather coarsely punctured. Abdominal sternites less strongly shining, finely sparsely punctured.

Female: Unknown.

Male terminalia (ventral view): sixth sternite broadly deeply emarginate, apex of emargination arcuate; seventh sternite nearly as broad as long, sides arcuately converging to more rapidly rounded apices, apex with a moderately deep V-shaped notch; ventral accessory process extending beyond seventh sternite, aciculate; (lateral view): seventh sternite robust, sub-ovate, apex acutely rounded; last tergites normally produced; accessory processes appear to be united, ventral process falcate, produced caudally beyond seventh sternite, connected by a vertical column with dorsal process produced caudally as a short truncate rod.

Holotype male: ARIZONA: Madera Canyon, Santa Rita Mountains, 18-VIII-68, Karl Stephan, [Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada]

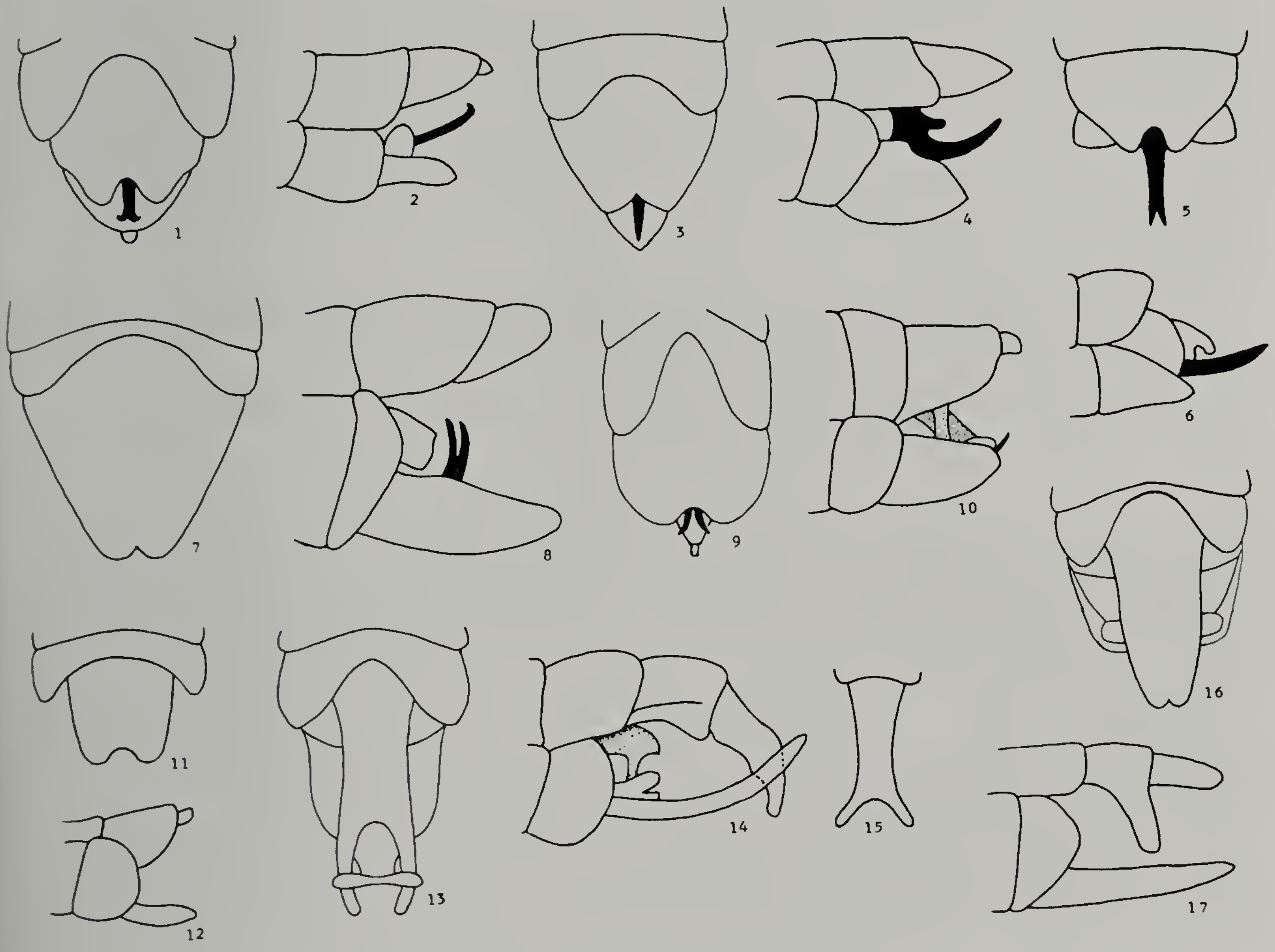

Fig. 1-17: Terminal abdominal segments: 1) *Malthinus rothi*, ventral aspect. 2) same, lateral aspect. 3) *Malthinus cuspidatus*, ventral aspect. 4) same, lateral aspect. 5) *Malthinus sowerestanus*, ventral aspect. 6) same, lateral aspect. 7) *Malthinus tricolor*, ventral aspect. 8) same, lateral aspect. 9) *Malthinus sancticatalinus*, ventral aspect. 10) same, lateral aspect. 11) *Malthodes aciculatus*, ventral aspect. 12) same, lateral aspect. 13) *Malthodes neomexicanus*, ventral aspect. 14) same, lateral aspect. 15) same, caudal aspect. 16) *Malthodes stephani*, ventral aspect. 17) same, lateral aspect.

Malthinus sowerestanus Fender, NEW SPECIES

(Fig. 5-6)

Piceous. Head in front of middle of eyes, basal antennal segment beneath and pronotum flavous. Elytral apices narrowly lemon yellow. Trochanters, apices of coxae, and narrow bases of femora testaceous. Pubescence cinereous, depressed, fine, short and inconspicuous. Length 4mm.

MALE. Indices: O. I. 51; H. P. I. 73; P. I. 78; A. F. 5-6-7, 4X. *Head* feebly shining, much wider than pronotum, finely moderately closely punctured, punctures separated by a little more than their individual diameters; eyes large and prominent; antennae slender, extending to tips of wings in repose. *Pronotum* shining, very finely sparsely punctured, anterior margin arcuate and finely beaded, somewhat reflexed; anterior angles rounded, more strongly reflexed; sides sinuate, feebly convergent to obliquely rounded and slightly prominent hind angles; basal margin arcuate, finely beaded medially, rather strongly reflexed towards sides. *Scutellum* apically emarginate, finely sparsely punctured. *Elytra* feebly narrowed and somewhat dehiscent apically, coarsely sparsely punctured, with sparse fine transverse rugae to the tumid and finely sparsely punctured apices; sutural costa feeble, discal costa strongly elevated and evident. Thorax beneath shining, moderately sparsely punctured with interspersed coarse and fine punctures. Abdominal sternites feebly shining, coarsely, moderately closely punctured, punctures separated by about twice their individual diameters.

FEMALE: Unknown.

Male terminalia (ventral view): sixth sternite feebly arcuately emarginate; seventh sternite transverse, sides rapidly sinuately converging to medially emarginate apex, emargination moderately broadly deeply U-shaped, sides of ventral plate extending laterally as pale subtriangular flanges; ventral spinose accessory process slender, apex with a deep triangular incision, tips acute; (lateral view): ultimate tergite not extended, apical process concealed; seventh sternite subcuneiform; pale ventral plate elevated as an apical disc; ventral accessory process narrow, ensiform; dorsal accessory process basally adhering to ventral process, apically extended and arched.

Holotype male: ARIZONA: Cochise Co., S.(outh) W.(estern) R.(esearch) S.(tation), 5 mi. w. Portal, 22-VIII-63, 5400′, Evans (no initials), [American Museum Natural History].

The specific name for this species was derived from the first 2 letters of each part of the name of the type locality.

Malthinus tricolor Fender

(Fig. 7-8)

Malthinus tricolor Fender, Amer. Midl. Nat. 46(3):522.

MALE. Coloration similar to female, pubescence aureous on pale areas, black on black, length 4mm. Indices: O. I. 44.7; H. P. I. 66; P. I. 79; A. F. 7-8-9, 5X. Head large, much wider than pronotum, dull, finely, very closely punctured, in some areas punctures contiguous forming irregular eroded lines; margin of clypeus arcuate on each side; eyes very large and prominent; antennae slender, extending to tips of wings in repose, feebly tapered from third segment to tips, segments 3 to 10 elongate-subserrate, more evidently so towards antennal bases, interantennal area elevated. *Pronotum* shining, transverse, two-thirds as wide as head, rather strongly arched, anterior margin arcuate, anterior angles rounded, sides feebly arcuate, converging somewhat to obtusely rounded hind angles, basal margin more strongly rounded than anterior, not reflexed or explanate at angles, marginal bead even throughout, disc finely sparsely punctured. *Scutellum* wider than long, subtriangular, apex triangularly notched. *Elytra* abbreviated, extending to about middle of third abdominal sternite, with impunctate sutural, discal and humeral costae, intercostal areas coarsely irregularly punctured to tumid and finely scabrous apical fourth. Thorax beneath shining and finely sparsely punctured. Abdominal sternites shining and more coarsely punctured.

Male terminalia (ventral view): sixth sternite broadly deeply concavely emarginate; seventh sternite sub-elliptical, sides arcuately converging to shallowly triangularly notched apex, 2 tips thus formed broadly rounded; (lateral view): last 2 tergites normally produced; sixth sternite short; seventh sternite unevenly digitate; visible portion of ventral accessory process erect, bifid, each half fang-shaped; dorsal accessory process a vertically aligned, subrectangular plate.

Allotype male from: ARIZONA: Molino Canyon, Santa Catalina Mountains, 8-VIII-69, K. Stephan, [California Academy of Sciences].

This species was previously known only by the holotype female and 2 female paratypes, collected: ARIZONA: St. Xavier Mission, Tucson.

Malthinus sancticatalinus Fender, NEW SPECIES

(Fig. 9-10)

Black. Head, base of first antennal segment and thorax rufous. Basal half or less of trochanters testaceous. Apical angles of second and third abdominal sternites broadly testaceous. Pubescence cinereous, fine and sparse, short and suberect on body above, longer and depressed on sternum and abdominal sternites. Length 4.5mm.

MALE. Indices: O. I. 56; H. P. I. 82; P. I. 78; A. F. 5-7-9, 4.4X. *Head* in front of eyes shining and finely sparsely punctured, less shining and more coarsely punctured behind; antennae long and slender, extending beyond tips of wings in repose by about length of last segment. *Pronotum* shining, finely sparsely punctured, transverse, anterior margin broadly arcuate, anterior angles rounded, sides arcuate to about middle, basal half sinuate to obtusely rounded hind angles, basal margin more strongly arcuate than anterior margin, marginal bead thick on basal margin, fine on lateral margins, obliterated on anterior margin. *Scutellum* as wide as long, apically bifid, lobes thus formed rounded, finely closely punctured. *Elytra* abbreviated, extending to base of fourth abdominal sternite, narrowing slightly to weakly dehiscent apices, each with two feebly indicated discal costae, inner costa short, surface finely rugose-punctate basally, becoming more coarsely so medially to feebly tumid and closely, finely punctured apical fourth. Body beneath shining, finely sparsely punctured, a little more coarsely so on abdomen.

FEMALE: Unknown.

Male terminalia (ventral view): apical margin of sixth sternite broadly, deeply, arcuately emarginate; seventh sternite a little longer than broad in exposed portion, sides evenly arcuately merging with apical margin which has a shallow U-shaped median indentation; ventral accessory process furcate, extending beyond seventh sternite, forks arcuately divergent; (lateral view): sixth sternite short, obliquely obovate; seventh sternite stout, unevenly elongate-ovate; penultimate tergite apically narrowed; ultimate tergite a little produced beyond seventh sternite, otherwise normal; ventral plate laterally bent up, produced slightly above edges of seventh sternite near its apical margin; ventral accessory process exposed apically as an arcuate, apically ascending spinose process; dorsal accessory process dual, an exterior, erect, almost parallel sided process, internal to this an oblique, broader parallel sided process.

Holotype male. ARIZONA: Bear Canyon, Santa Catalina Mountains, 6-VII-68, K. Stephan [Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada].

REVISED KEY TO NORTH AMERICAN SPECIES OF *Malthinus*

1. Elytra coarsely striate punctate 2
1′. Elytra finely, confusedly punctured 4

2(1). Elytra black with apical tumidities dark olivaceous .... *atripennis* LeConte
2′. Elytra testaceous with suture more or less widely infuscate 3

3(2). Male seventh sternite oval and entire .... *occipitalis* LeConte
3′. Male seventh sternite narrowly deeply incised at apex .... *difficilis* LeConte

4(1′). Pronotum finely closely granulose .... *granicollis* Fender
4′. Pronotum finely sparsely punctured 5

5(4′). Pronotum mostly dark 6
5′. Pronotum pale, sometimes with a narrow median dark stripe 9

6(5). Pronotum piceous with 4 discal pale spots and narrow anterior and posterior margins pale .... *quadrimaculatus* Fender
6′. Pronotum not so ornamented 7

7(6′). Pronotum and elytra black .... *georgiensis* Fender
7′. Pronotum castaneous, elytral apices creamy yellow 8

8(7′). Tips of male ventral accessory process acute, divergent and apically reflexed .... *rothi* Fender
8′. Tips of male ventral accessory process rounded, parallel and abutting .... *alexanderi* Fender

9(5′). Head, except mandibles, black .... *chisosensis* Fender
9′. Head, in addition to mandibles, at least in part pale 10

10(9′). Head black behind eyes 11
10′. Head at least partially pale behind eyes 13

11(10). Elytral apices dark olivaceous .... *cuspidatus* Fender
11′. Elytral apices creamy yellow 12

12(11′). In ventral view, apices of seventh sternite of male angulate, apical emargination shallowly subtriangular .... *subcostatus* Schaeffer
12′. In ventral view, apices of seventh sternite of male rounded, apical emargination rounded .... *sowerestanus* Fender

13(10′). Head rufous with a black, transverse, subtriangular interocular fascia 14
13′. Head, except eyes and antennae, entirely pale 15

14(13). Elytra entirely black .... *knulli* Fender
14′. Elytral apices creamy yellow .... *fjellandi* Fender

15(13′). Body beneath rufous .... *tricolor* Fender
15′. Body beneath piceous to black 16

16(15′). Seventh sternite of male apically truncate in ventral view; in lateral view, on apical half and on dorsal surface, a large ovate hinged appendage that may be extended caudally or tucked in under the penultimate tergite .... *bicolor* LeConte
16′. Seventh sternite of male not apically truncate and without a large ovate appendage on dorsal surface 17

17(16′). Ultimate tergite of male normally produced, not bifid as seen in ventral view .... *sancticatalinus* Fender
17′. Ultimate tergite of male bifid in ventral view .... *huachucae* Fender

Malthodes aciculatus Fender, NEW SPECIES
(Fig. 11-12)

Black. Anterior margin of clypeus narrowly flavous; basal antennal segment flavous basally, entire segment flavous beneath. Pronotum flavous, sides near anterior angles black, disc with a vague darkening of median portion covering middle third of pronotum and extending from apical third to but not including basal marginal bead. Elytra piceous. Apical margins of abdominal sternites 2 to 5 narrowly testaceous medially, becoming widely so at apical angles. Apices of coxae and basal half of trochanters testaceous. Pubescence cinereous, fine, sparse and inconspicuous, suberect on body above, decumbent on ventral surface. Length 2mm.

MALE. Indices: O. I. 62; H. P. I. 90; P. I. 79; A. F. 8-9-13, 4.3X. *Head* finely sparsely punctured in front of antennae, more coarsely so behind, not constricted to neck until nearly an eye length behind eyes; eyes small and not very prominent; antennae slender, extending to about tip of abdomen; last segment of maxillary palpi apically aciculate. *Pronotum* nearly as wide as head, shining, finely sparsely punctured, anterior margin straight to rounded and narrowly reflexed anterior angles, sides sinuate to obtusely rounded and narrowly reflexed hind angles, basal margin arcuate, marginal bead moderately fine. *Scutellum* semicircular, somewhat wider than long, finely closely punctured. *Elytra* extending to about middle of fourth abdominal sternite, widest just behind humeri, narrowing to apice, becoming dehiscent beyond middle, moderately punctured, becoming rugose beyond basal fourth to tumid and finely closely punctured apices. Thorax beneath finely, very sparsely punctured. Abdominal sternites microreticulate with occasional groups of large punctures, rather confusedly arranged.

Female. Indices: O. I. 37; H. P. I. 117; P. I. 77; A. F. 8-9-13, 3X. Pronotum flavous with sides near anterior angles black. Similar to male. *Head* narrower than pronotum; eyes smaller and less prominent; antennae shorter, extending to about apex of fifth abdominal sternite. Apical abdominal segments normal for the sex. Length 2.5mm.

Male terminalia (ventral view): apical margin of sixth abdominal sternite broadly arcuately emarginate, emargination extending medially to middle of segment; seventh sternite broadly produced, nearly as broad as long at widest visible portion, sides arcuately converging apically, apex with a broad U-shaped median indentation, tips rounded; (lateral view): last tergites produced in a normal manner; sixth sternite short, apically arcuate; seventh sternite extending nearly as far as penultimate tergite, feebly arcuately ascending apically, subdigitate.

Holotype male, allotype female and 3 male paratypes: CALIFORNIA: Moro Bay, 17-VI-69, K. Stephan. One male and 2 female paratypes: CALIFORNIA: Big Sur, 16-VI-69, K. Stephan. Holotype and allotype [Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada].

This species belongs in group I of the genus. It differs from any other described species in its coloration of the basal antennal segment, small eyes, length of head behind the eyes, aciculate apical segment of the maxillary palpi and the shape of the seventh abdominal sternite in ventral view. It is probably closest to *Malthodes pictithorax* Fender which has the basal antennal segment entirely piceous, the eyes larger and more prominent, the last segment of the maxillary segment not apically aciculate, the seventh sternite, in ventral view, is evidently longer than wide with the apical notch not U-shaped.

The series from Moro Bay has the median dark area of the pronotum absent to feebly indicated by a rather vague darkening of the median portion. In the specimens from Big Sur, the median black area is clear cut in one specimen, quite evident but vaguely delimited on the others. However there can often be considerable variation in the coloration of the pronotum and these specimens have the other more pertinent characteristics.

Malthodes neomexicanus Fender, NEW SPECIES
(Fig. 13-15)

Black. Shining. Anterior and basal margins of pronotum narrowly paler. Apices of elytra dark olivaceous. Apical margins of abdominal sternites 2 to 5 rather widely testaceous. Apical abdominal sternites dark fulvous, apex of penultimate tergite and all but tips of ultimate tergite dark flavous. Pubescence cinereous, fine, sparse and inconspicuous. Length 4mm.

Male. Indices: O. I. 50; H. P. I. 92; P. I. 79; A. F. 11-16-21, 4.4X. *Head* in front of antennae shining and finely sparsely punctured; feebly shining and sparsely, a little more coarsely punctured behind and on neck; antennae shining and finely sparsely punctured; feebly shining and sparsely, a little more coarsely punctured behind and on neck; antennae slender, extending to tips of wings in repose. *Pronotum* shining, transverse, finely sparsely punctured; anterior margin nearly straight medially, becoming sinuately indented towards sides to rounded anterior angles; sides nearly straight and parallel to less sharply rounded hind angles; basal margin arcuate; marginal bead fine, becoming thickened at anterior angles. *Scutellum* broader than long, sides sinuately converging to bilobed apex, median apical notch shallowly narrowly V-shaped. *Elytra* extending to apex of fourth abdominal sternite, finely rugose punctate in basal half, becoming slightly more rugose beyond middle to the tumid and finely sparsely punctured apical sixth. Thorax beneath shining and finely sparsely punctured. Abdominal sternites shining, finely sparsely punctured and with short transverse microrugae.

FEMALE: Unknown.

Male terminalia (ventral view): sixth sternite broadly deeply emarginate, apex of emargination evenly rounded; seventh sternite stout, elongate, forked for about apical third, apex of furcation rounded, forks arcuate, apices rounded and feebly converging; tips of ultimate tergite received in furcation at least at rest; (lateral view): seventh sternite arcuate, parallel sided to rounded tips; last tergites produced caudally; ultimate tergite with dorsal surface sinuate, ventral surface uneven; ventral accessory black (as illustrated); (caudal view): ultimate tergite elongate, broadly furcate near apex, forks widely divergent, tips rounded.

Holotype male: NEW MEXICO: The Pine Forest Camp, Lincoln National Forest, 8750′, 13-VII-68, K. M. & W. M. Fender [California Academy of Sciences].

This species is in group VIII of the genus and would key to *Malthodes chiricahuae* Fender. From that species it differs in pronotal coloration, the less stout seventh sternite and the differently shaped ultimate tergite, in both lateral and caudal view.

Malthodes stephani Fender, NEW SPECIES
(Fig. 16-17)

Head black, mandibles testaceous. Pronotum flavous with anterior half of lateral margins black. Scutellum piceous. Elytra and thorax beneath black. Trochanters and apices of coxae testaceous. Apices of abdominal sternites 2 to 5 narrowly whitish; sixth sternite medially, seventh sternite and last two tergites flavous. Pubescence cinereous, fine, sparse and depressed. Length 2.75mm.

MALE. Indices: O. I. 60; H. P. I. 100; P. I. 76; A. F. 5-5-8, 4.4X. *Head* shining, finely sparsely punctured in front of antennae; sparsely, a little more coarsely punctured behind, becoming more closely granulate-punctate between eyes directly behind antennae; antennae extending to tips of wings in repose. *Pronotum* shining, finely sparsely punctured; anterior margin shallowly arcuate; anterior angles rounded; sides sinuate, converging slightly to obtuse hind angles; basal margin more strongly arcuate than the anterior; marginal bead fine on anterior and basal margins, becoming obsolete on sides. *Scutellum* triangular, more than twice as broad as long, finely closely punctured. *Elytra* extending to apex of emargination of sixth sternite, finely sparsely punctured in basal third, becoming feebly rugose-punctate medially, apical fifth tumid and finely sparsely punctured. Thorax beneath shining and finely sparsely punctured. Abdominal sternites less strongly shining, more coarsely punctured.

FEMALE: Unknown.

Male terminalia (ventral view): sixth sternite broadly deeply emarginate, apex of emargination arcuate; seventh sternite elongate, subspatulate, narrowed apically, with a small narrow apical notch, lobes thus formed rounded; (lateral view): seventh sternite falcate; penultimate tergite with sides strongly produced ventrad as digitate processes; ultimate tergite produced caudally as a digitate process.

Holotype male. CALIFORNIA: Tom's Place, Mono County, 13-VI-69, K. Stephan [Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada].

This species is in group X of the genus. It would key to *Malthodes vanduzeeana* Fender and *M. complexipygus* Fender. In the former, the sides of the seventh sternite (in ventral view) are straight, converging to the apex which has a narrow U-shaped indentation, the tips sharply rounded. In the latter, the sides of the seventh sternite (in ventral view) are sinuate, the segment becoming wider near the apical fifth and the tips are acute with the apical notch triangular.

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